U. S. NUCLEAR REGULATORY COMMISSION

REGION I

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Licensee:	GPU Nuclear Corporation
Facility:	Three Mile Island Station, Unit 1
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EXECUTIVE SUMMARY

This inspection involved a review of Three Mile Island, Unit 1's, implementation of the maintenance rule in accordance with the regulations of 10 CFR 50.65. The report covers a one week onsite inspection by regional and headquarter's inspectors during the week of May 18-22, 1998.

The team concluded that TMI had implemented an effective and thorough maintenance rule program, based upon the following aspects.

- All structures, systems, and components (SSCs) were appropriately identified and included within the scope of the maintenance rule. For those SSCs that were excluded from the scope of the rule, justification was found to be correct and complete.

- Appropriate goal setting and monitoring was in place for those SSCs that were in an (a)(1) status. Corrective and preventive maintenance was appropriate and effective for those SSCs in an (a)(2) status.

- The system engineers were very knowledgeable of the maintenance rule and appropriately maintained an acute awareness of their system responsibilities. Lotus Notes was an excellent tool with which the system engineers were well versed and effectively used to monitor and trend the performance of their responsible systems.

- Industry operating experience (IOE) had been incorporated into the maintenance program, and was being used to establish goals and improve system performance. However, it was noted that, administratively, several system engineers were slow in the closure of IOE review assignments. Licensee personnel had previously identified this area of weakness and had recently instituted measures to correct this concern.

- The establishment of SSC risk significance was deemed acceptable. The primary use of the TMI-1 NOHUMAN model for SSC importance measure evaluation was not consistent with the intended methodology, as suggested in NUMARC 93-01, however, all SSCs were determined to have been appropriately ranked in regard to risk. The licensee's establishment of performance criteria for (a)(2) SSCs was also acceptable. The team viewed the licensee's use of two awareness levels for SSC unavailability to be good.

- Licensee initiated audits and self assessments of the maintenance rule program requirements were broad based and effective. Significant improvements in the implementation of the program were noted.

- Expert panel members, licensed operators, managers, and system engineers were fully aware of their responsibilities regarding maintenance rule requirements during normal operations and emergent work situations. Their understanding of rule was acceptable. Lotus Notes was an excellent tool with which the system engineers were well versed and effectively used to monitor and trend the performance of their responsible systems.

- The process and knowledge of personnel assessing risk before taking equipment out-of-service was acceptable. Also, the recently completed periodic assessment met all of the maintenance rule (a)(3) requirements. Identified weaknesses were being appropriately addressed by the licensee.

- The expert panel had performed its assigned functions in accordance with program procedures in an appropriate manner. The expert panel's decisions were appropriate regarding implementation of maintenance rule requirements.

- One minor violation was identified in that Table 9.3-1 of the updated final safety analysis report did not accurately reflect the actual plant operating conditions for the intermediate closed cooling water system. Appropriate corrective actions have been taken to ensure that the UFSAR is updated to accurately reflect normal plant operating conditions.

Report Details

M1 Conduct of Maintenance (62706)

M1.1 Structures, Systems and Components (SCCs) Included Within the Scope of the Rule

a. Inspection Scope

The team reviewed the scoping documentation to determine if the appropriate structures, systems and components (SSCs) were included within Three Mile Island, Unit 1's maintenance rule program in accordance with 10 CFR 50.65(b). The team used NRC Inspection Procedure (IP) 62706, NUMARC 93-01, Regulatory Guide (RG) 1.160, the Three Mile Island, Unit 1, Updated Final Safety Analysis Report (UFSAR), emergency operating procedures (EOPs), and other information provided by GPUN as references.

The team also reviewed additional information in system maintenance rule basis documents on scoping decisions for the following SSCs: emergency feedwater, main steam, main condenser, radiation monitoring and sampling system, emergency diesel generators, LPI/decay heat removal, HPI/makeup and purification, nuclear instrumentation, pressurizer, instrument air, control rod drive mechanisms, 250/125 volt DC, and intermediate closed cooling water system.

b. Observations and Findings

The licensee had determined that 171 systems out of 323 total systems were under the scope of the maintenance rule. Of the 171 systems that were in scope, 82 systems were identified as risk significant. The licensee also determined that there were 675 functions out of 1119 total functions that fell within the scope of the maintenance rule. Of these 675 functions, 217 were considered risk significant. Exclusion of systems from the scope of the rule were supported by adequate technical justification.

The team determined that TMI-1 had adequately defined scoping boundaries for each system and components within each system that had been included within the scope of the maintenance rule. System engineers were involved in the maintenance rule determination process for their systems. The system engineers identified the system functions for the maintenance rule expert panel (MREP). The MREP reviewed the functions and determined the risk significant functions and maintenance rule performance criteria. The system engineers subsequently reviewed and concurred with the expert panel final determinations.

c. Conclusions

All structures, systems, and components (SSCs) were appropriately identified and included within the scope of the maintenance rule. For those SSCs that were excluded from the scope of the rule, justification was found to be correct and complete.

M1.2 Safety (Risk) Determination, Risk Ranking, and Expert Panel

a. Inspection Scope

Paragraph (a)(1) of the maintenance rule requires that goals be commensurate with safety. Implementation of the rule using the guidance contained in NUMARC 93-01 also requires that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the rule. This safety consideration would then be used to determine if the structures, systems and components (SSCs) should be monitored at the train or plant level. The team reviewed the methods that the licensee had established for making these required safety determinations. The team also reviewed the safety determinations that were made for the systems that were reviewed in detail during this inspection.

b. Observations and Findings

Risk Determination Methodology

The licensee's process for establishing the risk significance of SSCs within the scope of the maintenance rule was documented in TMI Administrative Procedure (AP) 1082, "NRC Maintenance Rule," and the "Maintenance Rule Technical Basis Document" memorandum (July 31, 1997). These documents were reviewed and found to have adequately described the process of determining the risk significance of SSCs.

The licensee had used a risk significance method similar to the guidance provided in NUMARC 93-01 for the identification of risk significant SSCs. GPUN had used their TMI-1 PRA model that supported the development of their Individual Plant Examination (IPE) for internal events and Individual Plant Examination for External Events (IPEEE) for their risk significance determination. As suggested in NUMARC 93-01, GPUN had considered a SSC to be risk significant if the a risk reduction worth (RRW) were greater than 1.005 or if the risk achievement worth (RAW) were greater than 2.0. The licensee's PRA model was a large event tree/small fault tree, and the licensee considered a SSC risk significant if the SSC cumulatively accounted for 90% of the contribution to the CDF from independent normalized system importance. This method was reviewed and was considered acceptable.

In addition to the suggested NUMARC 93-01 method, two additional risk significant evaluations were performed. The first evaluation considered an SSC risk significant if it contributed to the isolation and cooling function of the primary containment. The second evaluation was an initiating event importance. If an initiating event contributed more than 1% to the total mean core damage frequency, a review of the initiating event was done to determine if any SSCs contributed to that initiating event and if the SSC should be added to the risk significant list. These two additional evaluations were considered by the team to be good evaluations in support of risk significance determination of SSCs.

The team also reviewed the TMI-1 PRA in its application in risk significance determination for the maintenance rule. The TMI-1 PRA model was originally completed in 1987 and then updated in 1992 to support the IPE submittal in March 1993. The mean core damage frequency (CDF) due to internal initiators was 4.19E-5 per year, with a truncation level of 1.0E-12.

For the risk significance determination, the base case TMI-1 PRA model was adjusted to remove the human action contributions (i.e., human actions set to guaranteed success). This model was called the TMI-1 NOHUMAN model. The TMI-1 NOHUMAN model had a CDF approximately 35% lower than the base case model. SSC importance measures and risk significance determination were based on the TMI-1 NOHUMAN model. The team noted that the use of the TMI-1 NOHUMAN model as the primary model for risk determination was not consistent with NUMARC 93-01 guidance. The team reviewed and discussed with the PRA staff, SSC importance measures based on the TMI-1 base case model. All SSCs were found to have been appropriately ranked.

The expert panel was presented with the list of SSCs that were determined to be risk significant based on the PRA results. None of the systems identified as risk significant were downgraded by the expert panel. The team did not identify any SSCs that had been misranked.

Performance Criteria

The team reviewed the licensee's performance criteria to determine if the licensee had adequately set performance criteria under (a)(2) of the maintenance rule consistent with the assumptions used to establish the safety significance. Section 9.3.2 of NUMARC 93-01 recommends that risk significant SSC performance criteria be set to assure that the availability and reliability assumptions used in the risk determining analysis (i.e., PRA) are maintained.

The reliability performance criteria used by the licensee had been established based on insights from the TMI-1 PRA results and a review of plant specific data that had been collected. Based on the RAW value for a SSC from the PRA, a maintenance preventable functional failure (MPFF) value was determined and set for a rolling three year period. The MPFF performance criteria value was then compared to plant specific data that had been collected. The MPFF performance criteria was established to not exceed the split fraction values (the frequency of a specific branch point of an event tree) used in the TMI-1 PRA model. System engineers were provided training regarding the potential for masking in systems with redundant components. A table was prepared by the PRA staff to assist the system engineers on systems that need to be monitored at the train level. The team noted the performance criteria to be very restrictive because the performance criteria is set less than or equal to the average values used in the PRA. The performance criteria method used by the licensee was considered by the team to be acceptable.

The unavailability performance criteria used by the licensee had been established based on insights from the TMI-1 PRA results and a review of plant specific data that had been collected. Based on the RAW value for a SSC from the PRA, an unavailability was determined for the SSC over a 2 year rolling period. For risk significant systems with designated trains, unavailability was established and monitored at the train level, and at the component level for some systems if appropriate. The unavailability performance criteria was then compared against plant specific data that had been collected. A sensitivity case had been run with the TMI-1 PRA model to see the impact that may occur to the CDF. This sensitivity analysis resulted in a CDF of 4.8E-5 per year, or approximately a 14.3% increase in the base case CDF. For the base case CDF of 4.19E-5 per year, the Electric Power Research Institute (EPRI) PSA Applications Guide (August 1995) indicates a 15.4% increase as non-risk significant. Also, the licensee established two awareness levels for unavailability (i.e., 1/3 and 2/3 of the maintenance rule performance criteria unavailability) and specified these awareness levels in the SSC monitoring database to provide early indications for poor system performance to the system engineers and the work week planners.

<u>Expert Panel</u>

The team found that TMI's maintenance rule expert panel, composed of selected individuals with diverse backgrounds, has a substantial number of operations personnel, together with senior individuals experienced with maintenance, engineering, and probabilistic risk assessment. The maintenance rule expert panel reviewed the functions and determined the risk significant functions and maintenance rule performance criteria for those SSCs that fell under the scope of the maintenance rule. The expert panel also reviewed and concurred with SSCs as being classified as (a)(1) or (a)(2), action plans for (a)(1) SSCs, and goals/monitoring results for (a)(1) SSCs.

The inspectors were unable to attend any expert panel meetings, since there were none scheduled during the inspection. However, a review was completed of the qualifications of the panel members and past expert panel meeting minutes. Based on these reviews, the team determined that the expert panel had executed its responsibilities accordingly and had exhibited appropriate decision making regarding maintenance rule program requirements.

c. Conclusions

The establishment of SSC risk significance was deemed acceptable. The primary use of the TMI-1 NOHUMAN model for SSC importance measure evaluation was not consistent with the intended methodology, as suggested in NUMARC 93-01, however, all SSCs were determined to have been appropriately ranked in regard to risk. The licensee's establishment of performance criteria for (a)(2) SSCs was also acceptable. The team viewed the licensee's use of two awareness levels for SSC unavailability to be good.

The expert panel had performed its assigned functions in accordance with program procedures in an appropriate manner. The expert panel's decisions were appropriate regarding implementation of maintenance rule requirements.

M1.3 (a)(1) Goal Setting and Monitoring and (a)(2) Preventive Maintenance

a. Inspection Scope

The team reviewed program documents to evaluate the process established to set goals and monitor under (a)(1) and to verify that preventive maintenance had been demonstrated to be effective for SSCs under (a)(2) of the maintenance rule. The team also verified that appropriate performance criteria had been set for several SSCs. The team performed detailed programmatic reviews of the maintenance rule implementation for the following SSCs:

- Emergency Feedwater
- Main Steam
- Main Condenser
- Radiation Monitoring and Sampling
- LPI/Decay Heat Removal
- HPI/Makeup and Purification
- Nuclear Instrumentation
- Pressurizer
- Instrument Air
- Control Rod Drive Mechanisms
- 250/125 Volt DC
- Intermediate Closed Cooling
- Structures

Each of the above systems was reviewed to verify that goals or performance criteria had been established commensurate with safety, that industry-wide operating experience had been considered, that appropriate monitoring and trending were being performed, and that corrective actions had been taken when an SSC failed to meet its goal or performance criteria or experienced a maintenance preventable functional failure (MPFF). Goals and performance criteria for additional SSCs not listed above were also reviewed; however the depth of review was limited in scope.

b. Observations and Findings

The above systems were properly scoped and were appropriately placed in either an (a)(1) or (a)(2) status. Dispositions from (a)(2) to (a)(1) were accomplished in a timely manner and in accordance with licensee procedures. Risk significant and non risk significant designations for the above systems were properly assigned. The team agreed with these classifications. System engineers had assigned acceptable performance criteria and, where practical, had incorporated industry operating experience when establishing criteria. Industry operating experience (IOE) events were routinely reviewed by the onshift shift technical advisors (STAs). The STAs review and screen the information and assign each event to a particular system engineer for dispositioning. It was noted however that system engineers often did not inform the STAs that the IOE notification had been appropriately dispositioned. Evidence was provided to the inspectors that the system engineers were routinely reviewing and incorporating, if applicable, industry operating experience events, but they often failed to follow through with the proper notifications to the STAs that action had been taken. This area of concern had previously been identified by the licensee's nuclear quality assurance group. As a result of these reviews, the licensee initiated a corrective action plan that included the eventual movement of the IOE review responsibility from the STAs to a specific group under the nuclear review group. This group will be specifically responsible for the review and assignment of industry operating events. The licensee presented these intentions to the inspection team and indicated that this move would take place in the fall of 1998.

The engineers tracked system performance against assigned criteria and demonstrated familiarity with the various computer tools available to them for monitoring performance. Lotus Notes was an excellent tool with which the system engineers were well versed and effectively used to monitor and trend the performance of their responsible systems. During system walkdowns and interviews, the engineers demonstrated that they were very knowledgeable of their systems as well as their responsibilities regarding the maintenance rule.

High Pressure Injection (HPI)/Makeup & Purification

The team found that the licensee established unavailability performance criteria of less than 241 hrs. per HP train over two year rolling period. The maintenance rule performance criteria for HPI system unavailability for the "A" HPI Train was exceeded during the fourth quarter of 1996. Therefore, in February 1997 HPI became (a) (1) system. High unavailability was due to impact of MU-V-18 valve being inoperable during emergency system testing and to smaller extent due to out-of-service testing time associated with the implementation of Bulletin 89-10 "MOV" program.

The team questioned the licensee about a root cause analysis for the two contributors for high unavailability. The system engineer stated that the problem with MU-V-18 accounted for 75% of the MR performance goal and the MOV PM work accounted for approximately 15-20% of the goal. GPUN engineering identified the MU-V-18 issue as a design deficiency associated with the emergency system valve used to isolate the normal makeup line, MU-V-18. GPUN recognized that for specific small break loss of coolant accident (SBLOCA), that isolation of the normal MU line was an essential system function. For this reason, for testing of the emergency system (ES) actuation logic, MU-V-18 was "blocked" open each quarter. One train of HPI is unavailable when MU-V-18 cannot close.

The team noted that the corrective actions to overcome the system unavailability were technically adequate. These were: 1) Valve MU-V-18 logic which was modified during the last refueling outage (12R) to allow ES resting without "blocking" MU-V-18 open. 2) The scheduling of major and minor preventive maintenance work associated with Bulletin 89-10 MOVs was reviewed and a revised scheduled was developed to limit the unavailability impact.

The team concluded that GPUN took the proper measures to determined the root cause of the unavailability of HPI/Makeup and Purification System. GPUN's corrective actions were found to be adequate.

Low Pressure Injection (LPI)/Decay Heat Removal System

The team found that train "A" of the Decay Heat System exceeded the unavailability performance criteria limit of 351 hours in a rolling 2 year period. Present unavailability is at 420.44 hours, a large contributor to the unavailability of train "A" of decay heat was the decay heat pump DH-P-1A mechanical seal replacement. GPUN recommended a review of the methods used to install failed seals and successfully installed seals to determine the best available method.

A more recent event documented in CAP No. T1998-0389 which classified the decay heat as (a)(1) due to accumulated unavailability resulting from multiple seal failures of the DH "A" pump. The team questioned the licensee about a root cause for the seal failures of the DH "A" pump and about the condition of other DH pump seals. The licensee stated that the time spent in the seal replacement for DH-P-1A during the 12R outage (October 1997) was excessive due to a poor procedure for the seal assembly. The seal manufacturer was consulted and the procedure was revised.

The team concluded that the licensee carried out adequate corrective action, which included of the revision of the DH pump seal replacement procedure. Also, the system outages for decay heat, decay closed, decay river and building spray were scheduled so that they could do this work at the same time and thus, reduce overall unavailability.

Nuclear Instrumentation System

The team found that on January 2, 1998, the NI-7 power range neutron detector bottom ion chamber input to the reactor protection system (RPS) Channel "C" failed to approximately 0%, causing a power/flow/power imbalance trip in RPS Channel "C" (due to power imbalance). TMI determined NI-7 power range neutron detector to be a maintenance rule functional failure and was documented as such in the maintenance rule database. TMI verified that Channels "A," "B," and "D," RPS cabinets were operable, "C" RPS cabinet was placed in manual bypass. This reduces the RPS to a "2-out-of-3" logic with a degree of redundancy of 1. No further action is required per T.S. 3.5.1.2.

The team questioned if the root cause of the "C" RPS Channel failure was a maintenance preventable or not. TMI indicated that they have contacted several utilities to gather industry experience regarding Westinghouse WL23636 power range neutron detectors. The informal industry consensus is that detectors of this type are subject to age related failures after fifteen to twenty years of service. GPUN prepared a draft of the long range plan for replacement of the power range detectors which is currently being revised.

The team concluded that GPUN properly addressed the NI-7 power neutron detector functional failure. The root cause used a well-documented industry experience, and it was found adequate. The baseline of the condition of NI-7 power neutron detector and the monitoring of the condition of the NI-5, NI-6 and NI-8 using an electronic characterization and diagnostic test were noteworthy.

Structures

The licensee determined that 23 of 90 structures were within the scope of the Rule. All structures were category a(2). The team sampled the systems that were specifically left out of the scope and noted the facility had acceptable justification to exclude these structures. At the time of the inspection, TMI staff had completed baseline inspections of 12 of the structures. The team reviewed ten of the completed inspections and noted the inspections were thorough and that the plant staff appropriately generated corrective action requests to repair deficiencies. While the facility corrected some deficiencies almost immediately, they elected to delay other repairs until the next outage. The team determined this response was acceptable. However, for deficiencies that affected risk significant structures (as classified as by TMI's expert panel) the team noted that the licensee had not assessed whether the deficiencies might have an impact on the performance of the system(s) within the structure and whether it was acceptable to delay repairs until the outage. TMI staff accepted the team's observation and responded by generating a Level 1 task request to evaluate the effect of the deficiencies.

Intermediate Closed Cooling System

One minor violation was identified by the team in that the updated final safety analysis report (UFSAR) did not accurately reflect the actual plant operating conditions for the intermediate closed cooling system during normal plant operation.

Normal plant operation includes both letdown heat exchangers in service, however, the original design was for only one to be in operation. Operation with both heat exchangers in operation results in a system flow in excess of the specified system flow listed in Table 9.3-1 of the UFSAR. The UFSAR ICCW design flow is 790 gpm; the system flow with both letdown heat exchangers in operation is approximately 1000 gpm. An engineering analysis was previously performed to evaluate the increased flow condition on the pumps and heat exchangers, but no UFSAR change was completed. The licensee agreed with this UFSAR finding and initiated a CAP to revise the UFSAR to reflect actual plant operating conditions. This failure constitutes a violation of minor significance and is not subject to formal enforcement action.

Also, the team questioned the operation of the B ICCW system pump. The B ICCW pump is left in standby because it is powered from the same electrical bus as the B Makeup pump which is the normal in-service pump. In order to prevent a RCP trip/reactor trip on coincident loss of makeup to the seals and ICCW system loss due to a loss of a single electrical bus, the A ICCW pump (fed from the opposite electrical bus) is the primary system pump. The A ICCW pump remains in service the majority of time, with the B ICCW in standby. Recent vibration problems with the B ICCW pump resulted in the discovery that grease in the motor bearing was dry. The bearing was replaced and a reduction in the vibration levels was noted, however, the pump vibration levels were still higher than desired. Standby operation of the B ICCW pump may require different maintenance practices to ensure reliability. The licensee categorized the B ICCW pump high vibration problem not a functional failure because the vibration monitoring program indicated a problem existed before failure actually occurred. This determination was performed in accordance with the maintenance rule. Unavailability hours were also assigned to the B ICCW pump in accordance with the maintenance rule. The team had no further questions regarding standby operation of the B ICCW pump.

c. <u>Conclusions</u>

Appropriate goal setting and monitoring was in place for those SSCs that were in an (a)(1) status. Corrective and preventive maintenance was appropriate and effective for those SSCs in an (a)(2) status. The system engineers were very knowledgeable of the maintenance rule and appropriately maintained an acute awareness of their system responsibilities. They were however, somewhat slow in notifying the STAs that they had appropriately reviewed and dispositioned industry operating experience events to which they had been assigned. The licensee had previously identified this problem and had initiated actions to correct it.

A minor violation was also identified regarding a discrepancy in the UFSAR. In this instance, the UFSAR did not accurately reflect the actual plant operating conditions for the intermediate closed cooling water system. The licensee initiated appropriate actions to correct this discrepancy.

M1.3 Periodic Evaluations (a)(3) and Plant Safety Assessments Before Taking Equipment Out of Service

a. Inspection Scope

Paragraph 10 CFR 50.65(a)(3) requires that periodic evaluations be performed and adjustments be made where necessary to assure that the objectives of preventing failures through the performance of preventive maintenance is appropriately balanced against the objectives of minimizing unavailability due to monitoring or preventive maintenance. The team reviewed TMI administrative procedure 1082, NRC Maintenance Rule, administrative procedure 1073, Maintenance Effectiveness Assessment, and the results of their periodic assessment completed in February 1998 that covered the period of July, 1996 through September, 1997.

Also, paragraph (a)(3) of the maintenance rule states that the total impact on plant safety should be taken into account before taking equipment out of service for monitoring or preventive maintenance. The team reviewed the licensee's procedures and discussed the process with the maintenance rule coordinator, the PRA staff, plant operators, and work week planners and schedulers.

b. Observations and Findings

Periodic Assessment

The team found that administrative procedure 1082 contained TMI's criteria to implement an adequate Maintenance Effectiveness Assessment program. Administrative procedure 1073, Maintenance Effectiveness Assessment provides the guidance for performance of this assessment. In addition, the plant also performs a quarterly self assessment to monitor the ongoing status of the program.

A review of the periodic assessment, dated February 3, 1998, revealed that TMI monitors both reliability and availability for all risk significant and low risk significant standby SSCs.

TMI's approach for optimizing reliability and availability was developed using guidance in TMI's Maintenance Rule Periodic Assessment, Balancing Reliability and Availability procedure. The team found that AP 1082 follows the guidance contained in Regulatory Guide 1.160 and NUMARC 93-01 for optimizing reliability and availability through the system engineer review of unavailability, maintenance rule functional failures (FFs), maintenance preventible function failures (MPFFs), repetitive MPFFs, and corrective action data associated with improving SSC performance.

The maintenance rule coordinator is responsible for completing the periodic assessment. Any weaknesses identified are placed in the Corrective Action Program (CAP) and are tracked to completion. The nine (9) weaknesses identified in the first assessment were being tracked to completion in the CAP system and have been either completed or adequate progress had been made towards completion.

Safety Assessments Before Taking Equipment Out-of-Service for Maintenance

The licensee's process for determining plant risk prior to taking plant equipment out-of-service was documented in TMI procedure AP 1070 "TMI Maintenance Plan" Revision 13 (February 17, 1997).

The team went over the process and procedure for safety evaluations before taking equipment out of service with the work week schedulers and the PRA staff. The procedure is applicable for all modes of operation and the procedure is used by the work week planners to schedule maintenance activities at TMI. The RAW values for components that are to be taken out of service have been quantified from the TMI PRA and are provided in the procedure. If a maintenance configuration or emergent work occurs that results in a configuration that has not been evaluated, the procedure requires an evaluation by the PRA group for the configuration. The risk assessments for maintenance configurations at TMI are documented and stored in the Lotus Notes database. These configurations are stored in the database for future reference.

The team also reviewed the Control Room Integrated Logbook covering April 1998 to identify different plant configurations. The different configurations were reviewed and evaluated using the procedure AP 1070. No configurations were identified that were outside the evaluations provided in procedure AP 1070.

c. Conclusions

Based upon the reviews of the procedures for maintenance work and interviews with personnel, the process and knowledge of personnel assessing risk before taking equipment out-of-service was acceptable. Also, the recently completed periodic assessment met all of the maintenance rule (a)(3) requirements. Identified weaknesses were being appropriately addressed by the licensee.

M3 Staff Knowledge and Performance

a. Inspection Scope

The team interviewed managers, engineers and licensed operators to assess their understanding of the maintenance rule and associated responsibilities.

b. Observations and Findings

The system engineers were knowledgeable of their systems and responsibilities. The system engineers were familiar with the maintenance rule and understood the scoping, monitoring, and trending required of them for their systems responsibilities. Additionally, they made good use of industry operating experience to assist in performing root cause evaluations and subsequent corrective actions when needed. The team also interviewed selected operators, including shift supervisors, senior reactor operators, and reactor operators in the control room and determined that they were familiar with the maintenance rule as it applies to operations. However, the database listing structures, systems, and components in the maintenance rule scope is new and personnel in the control room were not totally familiar with the new system.

Overall licensed operator knowledge of the rule was acceptable. All personnel understood their responsibilities. The licensed reactor and senior reactor operators were specifically questioned about their responsibilities regarding on-line and emergent maintenance risk assessment and it was apparent they were adequately versed on the subject. Continuing training is scheduled during upcoming requalification training sessions.

Expert panel training was kept current, with the last training received by the panel being in January 1998. The material used in the training was found adequate. GPUN provided adequate emphasis to risk reduction worth, core damage frequency contribution, risk achievement worth, system important to containment functions and initiating event importance.

c. Conclusions

Expert panel members, licensed operators, managers, and system engineers were fully aware of their responsibilities regarding maintenance rule requirements during normal operations and emergent work situations. Their understanding of rule was acceptable.

M7 Quality Assurance (QA) in Maintenance Activities

a. Inspection Scope

The team reviewed assessments which were conducted by or initiated by Three Mile Island personnel to determine if the maintenance rule had been properly implemented.

b. Observations and Findings

The team reviewed various station-wide self assessments of the maintenance rule program implementation and determined that these assessments were in-depth and provided appropriate feedback for maintenance rule program improvements. Industry operating experience was incorporated, as appropriate, together with the audit reviews, thus incorporating the most recent interpretations of the rule. Both internal and external audit reports were reviewed. Audit findings from both types of reports were appropriately dispositioned and acted upon in a timely manner. Long term corrective actions are actively being tracked and reviewed. The team determined that the correct implementation of the maintenance rule program at Three Mile Island was due, in part, to their responsiveness to the audit findings.

c. Conclusions

Self assessments and audit reports were detailed and thorough. The thoroughness and responsiveness to these audit findings helped to ensure that Three Mile Island, Unit 1, correctly implemented the requirements of the maintenance rule.

V. Management Meetings

X1 Exit Meeting Summary

The team discussed the progress of the inspection with TMI-1 representatives on a daily basis and presented the inspection results to members of management at the conclusion of the inspection on May 22, 1998.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

General Public Utilities Nuclear

James Langenbach, GPUN Director TMI
Michael Ross, GPUN Director Operations and Maintenance
Larry Noll, GPUN Director Plant Operations
Harold Wilson, Supervisor Maintenance Assessment
Gordon Skillman, Director, Configuration Control
Howard Crawford, GPUN Manager Equipment Reliability Programs
Hassan Elrada, PRA Engineer
Chuck Adams, PRA/IOSRG Engineer
James Paules, Lead Operations Engineer
Walter Marshall, Operations Engineer

LIST OF INSPECTION PROCEDURES

IP 62706 Maintenance Rule

LIST OF PROCEDURES AND DOCUMENTS REVIEWED

AP 1082, "NRC Maintenance Rule," Revision 3, May 15, 1998.

AP 1070, "TMI Maintenance Plan," Revision 13, February 17, 1997.

AP 1073, "Maintenance Effectiveness Assessment," Revision 9, June 24, 1997.

AP 1034, "Plant Review Group," Revision 15, May 15, 1998.

"System Engineer Guidelines Attachment 3 Maintenance Rule," Revision 0, May 14, 1998.

Three Mile Island Unit 1 Individual Plant Examination Submittal Report, GPUN, March 1993.

Three Mile Island Unit 1 Individual Plant Examination of External Events Submittal Report, GPUN, December 1994.

H. L. Wilson memorandum to File, Subject: "Maintenance Rule Technical Basis Document," TMI 3220-97-018B,July 31, 1997.

LIST OF ACRONYMS USED

CDF	Core Damage Frequency
EPRI	Electric Power Research Institute
GPUN	General Public Utilities Nuclear
IPE	Individual Plant Examination
IPEEE	Individual Plant Examination for External Events
LER	Licensee Event Report
MPFF	Maintenance Preventable Functional Failure
NUMARC	Nuclear Management and Resources Council
ORAM	Outage Risk Assessment Management
PRA	Probabilistic Risk Assessment
PSA	Probabilistic Safety Assessment
RAW	Risk Achievement Worth
RRW	Risk Reduction Worth
SSC	Systems, Structures, and Components
TMI-1	Three Mile Island, Unit 1